

Off-Pump Coronary Artery Bypass Graft

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Abstract:

Background: Coronary artery bypass graft is routinely performed on an arrested heart using cardiopulmonary bypass with aortic cross clamping and Cardioplegia. Off-pump coronary artery bypass graft (OPCABG) is being increasingly used in selected cases as an attempt to decrease morbidity and mortality.

Objective: The main objective of this study is to clarify those patients who are indicated for OPCABG despite it is surgically demanding technique and to evaluate the mortality and morbidity associated with such procedures.

Patients and methods: It is a retrospective study of 28 patients with coronary artery disease, in need for coronary artery bypass graft admitted and surgically treated at the Iraqi Centre for Heart Diseases during 2 years period using OPCABG.

Results : most of the patients were male (82%), and most of them (42%) were within age group of 61-70 years, the main indication of off-pump coronary artery bypass graft was left ventricular dysfunction and the least indication was cerebrovascular accident and renal impairment.

Conclusion: Off-pump coronary artery bypass graft is useful in context of morbidity and mortality when indicated for patients with special criteria, those patients might get harm if we put them on bypass.

Key words: Coronary artery bypass grafting, off-pump Coronary artery bypass grafting, left ventricular dysfunction.

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Introduction:

Coronary artery bypass grafting (CABG) is routinely performed by cardiopulmonary bypass with aortic cross clamping and cardioplegia or by cardiopulmonary bypass without aortic cross clamping using a tissue stabilizing device like the "octopus" or "starfish" device (supporting cardiopulmonary bypass); or on beating heart referred to as off-pump CABG (OPCABG). [1-3] In experienced hands OPCABG offers lesser postoperative risks than conventional CABG with clear and positive consequences on in hospital costs and short term follow up. During long term follow up the revascularization benefits obtained by OPCABG are not inferior to those conferred by conventional CABG and significant reduction of the incidence of severe cardiac events can even be seen in a particular subset of patients. [4] Resurgence in beating heart surgery began in the early 1990s in an attempt to decrease the morbidity associated with CABG and early development of OPCABG was hindered by crude instrumentation as well as limited exposure through small incisions. Technological advancement has significantly facilitated the performance of beating heart surgery. [5] OPCABG has a definitive role in cardiac revascularization surgery. Numerous advantages have been reported, but the universal use of this approach in surgery is under debate. Further studies will identify the types of patients who would clearly benefit from OPCABG. A clear understanding of the surgical procedure and the mechanism of

the hemodynamic changes are of paramount importance for the surgical team in charge of such cases. [6]

Patients and Methods:

This is a retrospective study of 28 patients with coronary artery disease in need for CABG, admitted at the Iraqi Center for Heart Diseases during the period from January 2012 to December 2013.

All the patients were fully evaluated and Investigated including detailed History taking ,comprehensive examination and all the preoperative investigations ,were done for the final decision as regard the need for surgery.All the patients underwent off pump CABG using the needed instruments) Myocardial Stabilizer ,Intra coronary shunts ,CO2 blower And Vessel loops (to perform this demanding procedure using Internal Mammary Artery and Saphenous vein as conduits.All the data were taken from hospital patient's records and theater records and special formula was used to divide patients with regard to their Age ,sex ,co morbidities ,indications for surgery ,Ejection Fraction and the number of diseased vessels.

Results:

Twenty-Three (82%) of our patients were male and only Five patients (18%) were female. The distribution of male to female ratio is illustrated in Fig. (1).

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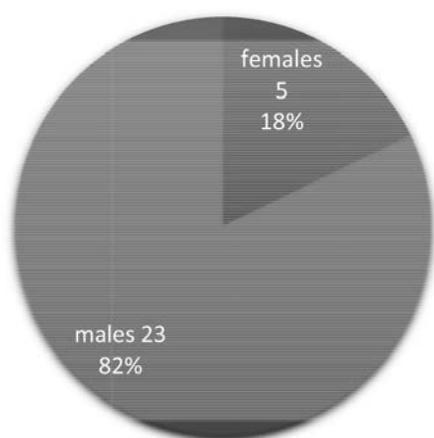


Figure 1: SEX DISTRIBUTION OF PATIENTS

Eleven of our patients (42%) were within age group of (61-70 years) while Eight of them (28%) were between (51-60 years), seven (25%) were between (41-50 years) and only two patients (7%) were above 71 years. The mean age of our patients is (61 years), the distribution of patients as regard their age is shown in figure (2).

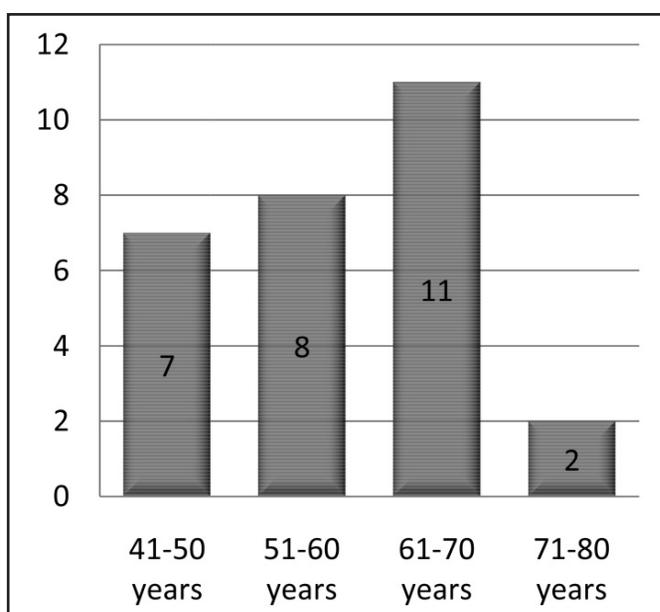


Fig. (2): age distribution of our patients.

Eight of our patients (29%) were diabetic, while two of them were Hypertensive. Both Diabetes and Hypertension, were present in three patients only. The rest 15 patients (53%) were neither diabetic nor Hypertensive. The main indication for OFF pump CABG was LV-dysfunction in (53%) of cases, the next one is single Vessel disease (LAD) (21%), the third indication was non graftable (non LAD) vessels (18%). The least two indications were CVA and Renal Impairment, the Indications for OPCABG is illustrated in Fig. (3).

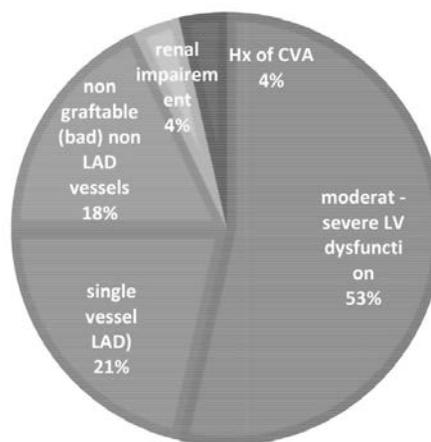


Figure 3: Indications for surgery

Equal number of patients (36%) 10 cases required single and double grafts, while (25%) 7 cases required 3 grafts and only 1 case (3%) required 4 grafts as shown in figure (4).

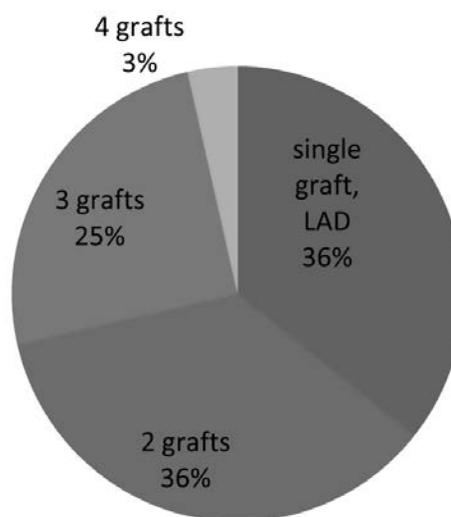


Figure 4 Number of vessels grafted

Thirteen patients (46%), were with ejection fraction more than 50%. Nine patients (32%) with ejection fraction between 40-50%, while only 6 patients (21%) with ejection fraction between 30-40% as illustrated in figure (5).

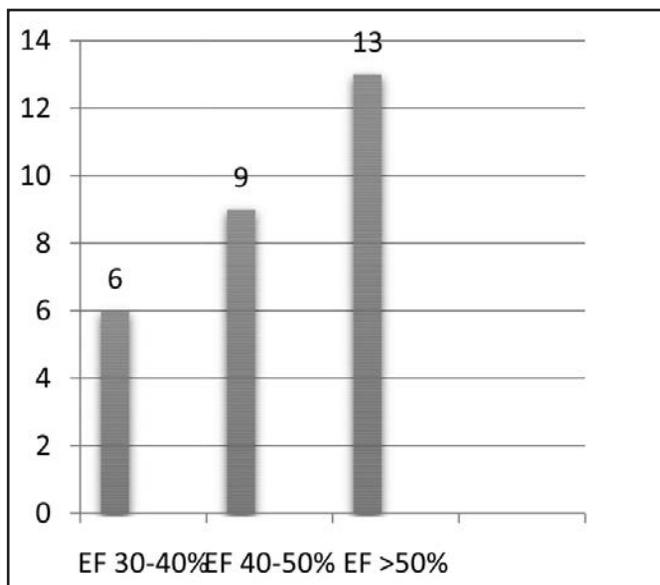


Fig. (5) Patients distribution according to ejection fraction.

Out of the 28 patients, two of them died (7%) one because of acute abdomen and the other one because of low cardiac output syndrome.

Discussion:

This is a retrospective study, represent single center experience (Iraqi Centre for Heart Diseases) in Baghdad.

OPCABG is not a routine procedure in doing CABG, this procedure was invented primarily to help patients avoiding the drawbacks of CPB that can be harmful to patient's organs in different degrees. Male is the predominant sex in this study which is corresponding to other study [3]. Mean age group was 61-70 years due to high incidence of Ischemic heart disease at this age group and late presentation of the patients to the surgical department and this is compatible to the study done by Khan et al [3] The Smaller number of patients in our study were diabetic and/or hypertensive this is can be explained by early presentation as single or double vessel disease, those patients are amenable for OPCABG and this is similar to the study done by Khan NE, et al [3]. High risk patients were the main indication of patients in this study and the main criteria was the LV dysfunction, because of the presence of such bad LV function, it was preferable not to go on bypass and to encounter difficulties in getting off bypass even with performing perfect grafts. Previous studies has shown that high risk coronary artery bypass patients may predicting benefit from avoiding CPB (cardiopulmonary bypass). Predicted operative mortality revealed significant survival benefit of OPCABG. Low risk patients as a group also appear to benefit from OPCABG but this comparison lack the statistical significance and this may result from great diversity within the low risk group representing some patient's characteristics that predispose

benefits and others that don't. [7-10]. Regarding the mortality, two out of 28 patients died; one because of low cardiac output syndrome who had low ejection fraction preoperatively and the other one because of acute abdomen which developed 3 days postoperatively and it was unrelated to the coronary problem but it can be correlated to the generalized atherosclerotic process. In the other studies the mortality was comparable to on-pump CABG (<4%) which is almost the same in our centre regarding on-pump CABG [7-10]. Mortality in OPCABG is higher in our study due to the small number of cases collected. The main limitation of this study is the lack of outpatient resources for follow up and it is the same limitation for the SMART study [11]. Unlike traditional CABG were the Anesthesiologist plays a passive role during performance of bypass grafting, involvement of the anesthesia team is essential for successful OPCABG [12].

Conclusion:

Off pump is surgically demanding procedure, it is useful in context of morbidity and mortality when indicated for patients with special criteria, those patients might get harm if we put them on bypass, but it might be harmful technique if used for patients that can stand the bypass machine.

Author contributions:

Study conception and design: Mohamed S. Ahmed

Acquisition of data: Mohamed S. Ahmed, Ahmed A. Neamah, Dr. Ali N. Abed

Analysis and interpretation of data: Mohamed S. Ahmed, Ahmed A. Neamah

Drafting of manuscript: Mohamed S. Ahmed, Ali N. Abed

Critical revision: Mohamed S. Ahmed, Ahmed A. Neamah, Ali N. Abed

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